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For the President of the European Patent Office

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p.o.

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Method and system for forwarding a service-related information to a network user

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**Method and System for Forwarding a Service-Related Information
to a Network User**

FIELD OF THE INVENTION

5 The present invention relates to a method and system for forwarding a service-related information, e.g. a service configuration, to a network user, e.g. a subscriber in an Internet Protocol Multimedia Subsystem (IMS).

BACKGROUND OF THE INVENTION

10 In order to achieve access independence and to maintain a smooth interoperability with wired terminals across the Internet, the IMS as specified e.g. in the 3GPP specifications TS 23.228, 24.228, 24.229 and 23.218 has been developed to be conformant to IETF (Internet Engineering Task Force) "Internet Standards". The IP multimedia core network (IM CN) subsystem enables network operators of mobile or cellular networks to offer their subscribers multimedia services based on and built upon Internet applications, services and protocols. The intention is to develop
15 such services by mobile network operators and other 3rd party suppliers including those in the Internet space using the mechanisms provided by the Internet and the IM CN subsystem. The IMS thus enables conversions of, and access to, voice, video, messaging, data and web-based technologies for wireless users, and combines the growth of the Internet with the growth in mobile communications.

20 Fig. 1 shows an architecture of an IMS network according to the above 3GPP (3rd Generation Partnership Project) specification. The architecture is based on the principle that the service control for home subscribed services for a roaming subscriber is in the home network HN, e.g. a Serving Call State Control Function (S-CSCF) is located in the home network HN. In Fig. 1, an S-CSCF 10 is shown,
25 which currently controls or serves a terminal device or user equipment (UE) 40 according to the subscriber profile or network coverage of the UE 40.

In general, an S-CSCF performs the session control service for the served UEs. It maintains a session state as needed by the network operator for support of the services which may be provided by an application server (AS) 60 which may be
30 located in an external network or in the home network HN or a visited network VN of the UE 40. Within an operator's network, different S-CSCFs may have different functionalities. The functions performed by the S-CSCF during a respective ses-

sion are e.g. registration, session flow management, charging and resource utilization management. When a subscriber roams to the visited network VN, the visited network VN supports a Proxy-CSCF (P-CSCF) 30 which enables the session control to be passed to the respective S-CSCF located at the home network HN and providing the service control. Furthermore, an Interrogating-CSCF (I-CSCF) 50 is provided in the home network HN as a contact point within the operator's network for all connections destined to a subscriber of that network operator, or a roaming subscriber currently located within that network operator's service area. There may be multiple I-CSCFs within an operator's network. The functions performed by the I-CSCF 50 include assigning an S-CSCF to a user performing a registration procedure, routing a request received from another network towards the assigned S-CSCF, maintaining the address of an S-CSCF from a subscriber database, e.g. a Home Subscriber Server (HSS) 20 as shown in Fig. 1, and/or forwarding requests or responses to the S-CSCF determined based on the address of change from the HSS 20.

The P-CSCF 30 is the first contact point within the IMS. Its address is discovered by the UE 40 following a PDP (Packet Data Protocol) context activation. The P-CSCF 30 behaves like a proxy, i.e. it accepts requests and services them internally or forwards them on, possibly after translation. The P-CSCF 30 may also behave as a User Agent, i.e. in abnormal conditions it may terminate and independently generate transactions. The functions performed by the P-CSCF 30 are forwarding register requests received from the UE 40 to an I-CSCF, e.g. the I-CSCF 50, determined using the home domain name as provided by the UE 40, and forwarding requests or responses to the UE 40.

Further details regarding the functions of the different CSCF elements shown in Fig. 1 can be gathered from the above mentioned 3GPP-specifications.

SIP (Session Initiation Protocol) is defined in the IETF (Internet Engineering Task Force) specification RFC 3161. It is a protocol allowing establishment, handling and release of end-to-end multimedia sessions. There are several additions to the SIP protocol, which e.g. allow event notification based on SIP, which is the basis for a SIP based Presence Service and other services.

Draft-rosenberg-sipping-conferencing-framework-01 ("Framework Draft") describes a framework for SIP conferences. Furthermore, draft-johnston-sipping-cc-

conferencing-01 ("Johnston Draft") describes in more detail how SIP conferences can be created.

The IETF has been specifying a Session Initiation Protocol (SIP) event package for registrations, as defined in "draft-ietf-sipping-reg-event". Through its
5 REGISTER method, SIP allows a user agent, which is an interface (e.g. browser) between the user and the network application, to create, modify, and delete registrations. Registrations can also be altered by administrators in order to enforce policy. As a result, these registrations represent a piece of state in the network that can change dynamically. There are many cases where a user agent would like to
10 be notified of changes in this state. The event package defines a mechanism by which those user agents can request and obtain such notifications.

The SIP REGISTER method provides a way for a user agent to manipulate registrations. Contacts can be added or removed, and the current set of contacts can be queried. Registrations can also change as a result of administrator policy. For
15 example, if a user is suspected of fraud, his registration can be deleted so that they cannot receive any requests. Registrations also expire after some time if not refreshed. Thus, registrations represent a dynamic piece of state maintained by the network.

The SIP Events Framework defines a generic framework for subscription to, and
20 notification of, events related to SIP systems. The framework is described in the IETF specification RFC 3265 and defines the methods SUBSCRIBE and NOTIFY, and introduces the notion of a package. A package is a concrete application of the event framework to a particular class of events, e.g. registration states. The
25 SUBSCRIBE message for the registration package may contain a body for filtering the subscription. It may be sent with or without the body. The default registration policy is that notifications are triggered from a SUBSCRIBE message and are generated every time there is a change in the state of any of the registered contacts for the resource being subscribed to. Those notifications only contain information on the contacts whose state has changed. The notifications are forwarded
30 using the NOTIFY message comprises in its body a registration information document which describes some or all of the contacts associated with a particular address-of-record.

In the 3GPP IMS Release 5 specifications TS 24.229, 24.228 and 23.218, the SIP registration state event package is used to inform about the user's registration

state to the subscribers of the event package. The functionality of this event is located in the S-CSCF. 3GPP IMS Release 6 will introduce new services to the system, such as Presence, Messages, Conferencing and MMS. According to the IMS Release 5 specifications, the IMS subscriber is either registered or deregistered.

- 5 IMS users need to get aware of service-specific configurations upon registration to the IMS network. Possible service configurations could be the Presence server assigned to the user, the MRFC assigned to the user for means of conferences, other application servers which the user specifically needs to contact, e.g. by means of event subscriptions, specific URIs (Uniform Resource Indicators) that the
- 10 users needs to register if the user wants to get the benefit of a specific service, e.g. a Push to Talk over Cellular (POC) service.

So far, service parameters have been transferred e.g. in the Request-URI header of a SIP message, e.g. "abc@xyz.com; service=poc", which however is not an IETF compliant solution. Additionally, a routing magic may be provided, such as "if

15 XYZ header is there then send this to ABC, although the Request-URI header indicates LMAA". Furthermore, the parameters may be pre-configured at the UE. However, in this case, the configuration effort is much too high and the static configuration is not flexible enough.

It is expected that there will be many types of ASs connected to the IMS system,

20 one example being a Push-To-Talk (PTT) or Push-over-Cellular (POC) AS. IMS will provide the AS's capabilities that can be used to implement services to the subscribers. These capabilities include e.g. 3rd party registration from IMS towards the AS. In the 3rd party registration, which is specified in the above 3GPP specifications, the registration towards the AS basically is just a notification that the registration in IMS has happened. However, it is not possible for the AS to start de-

25 registration of the subscriber or even a specific Public User Identity allocated to the subscriber. There is no mechanism provided, by which the external AS can ask or request the UE to deregister. The AS can deny the 3rd party registration. If the AS is then classified as critical, this should lead to the deregistration. Nevertheless, this requires that the registration is passed to the AS. It cannot actively

30 start the deregistration procedure.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a method, system and network device, by means of which a network user can be notified of a service configuration and/or a de-registration intent of an AS..

- 5 This object is achieved by a method of forwarding a service-related information from an IP-based network to a network user, said method comprising the steps of:
- providing at said IP-based network a first event package directed to a service configuration and/or at an application server a second event package directed to a de-registration state of said network user;
 - 10 - initiating a subscription of said network user to said first and/or second service-related event package; and
 - transmitting a notification informing about said service configuration and/or said de-registration from said IP-based network and/or said application server to said network user in response to said subscription initiation.
- 15 Furthermore, the above object is achieved by a network device for serving a network user in a data network, said network device being configured to store an event package directed to a service configuration of said network user, and to transmit a notification with a service configuration information towards said network user in response to a subscription of said network user to said service configuration event package.
- 20 Additionally, the above object is achieved by an application server for providing at least one service application to a network user, said server being configured to offer at least one event package directed to a service configuration and/or a de-
- 25 registration state of said network user, and to forward a notification informing about said service configuration and/or said de-registration towards said network user in response to a subscription of said network user to said at least one event package.
- 30 Moreover, the above object is achieved by a terminal device for providing a connection to a service application of an IP-based network, wherein said terminal device is configured to initiate a subscription to at least one event package directed to a service configuration of said terminal device and/or a de-registration state in response to a successful registration to said IP-based network.

Finally, the above object is achieved by a system for forwarding a service-related information to a network user, said system comprising the above terminal device and at least one of the above application server and the above network device.

5 Accordingly, at least one new event package is introduced which, is provided to offer configuration of multiple services to the terminal device of a network user without requiring any pre-configuration at the terminal device for these services. Another advantage is given in that a new event package at the application server enables active de-registration of a subscriber or a specific public user identity by the application server. Based on the AS-specific event package, the network user
10 can be informed if some specific event happens which requires the terminal device to be de-registered.

The new service configuration event package may be offered by a session control device assigned to a terminal device of the network user, wherein the subscription is initiated by the terminal device to the session control device, e.g. an S-CSCF of
15 an IMS network. This provides the advantage that the service configuration of the network user can be downloaded from a subscriber database via the usually available interface between the session control device and the subscriber database. In addition thereto, the network user does not need any pre-configured URI for this event package.

20 As an alternative, the service configuration event package may be offered by a default server, wherein the subscription is again initiated by the terminal device of the network user to the default server.

In general, the initiation step can be performed after a successful registration procedure of the terminal device of the network user.

25 The received service-related information can be stored at the terminal device to allow the network user to make use of the service-related information.

The de-registration event package may be provided at an application server, wherein the subscription is initiated to the application server. Then, the SUBSCRIBE request may be subjected to at least one filter criterion at a session
30 control device. Thereby, the session control device, e.g. S-CSCF, is able to control or restrict the forwarding of SUBSCRIBE requests. The de-registration notification may be transmitted from the application server towards the terminal device of the

network user in response to the occurrence of a specific event at the application server. This specific event may have been caused as a result of a failure situation or an exceeding of a prepaid account. As an example, the application server may be a Push To Talk (PTT) or Push-over-Cellular (POC) server.

- 5 In all above cases, the subscription may be initiated by forwarding a SIP SUBSCRIBE request from a terminal device of the network user towards the IP-based network. The notification is then transmitted to the network user in a SIP NOTIFY message. Hence, an easy and straight forward implementation is possible by using available SIP mechanisms.
- 10 Further advantageous modifications or developments are defined in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the present invention will be described in greater detail based on preferred embodiments with reference to the accompanying drawings, in which:

- 15 Fig. 1 shows a schematic block diagram of a network architecture in which the preferred embodiments of the present invention can be implemented;
- Fig. 2 shows a message signaling and processing diagram indicating a subscription procedure to a session control device according to a first preferred embodiment; and
- 20 Fig. 3 shows a message signaling and processing diagram indicating a subscription procedure to an application server according to a second preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

- 25 The preferred embodiments will now be described on the basis of an event package subscription in an IMS network architecture as shown in Fig. 1.

The IMS architecture shown in Fig. 1 refers to a set of core network entities using the services provided by the packet-switched domain to offer multimedia services. The HSS 20 is the master database for a given user and includes the functions of

conventional home location registers (HLRs) as well as new functionalities specified to IP networks, such as the IMS. The HSS 20 is the entity containing the subscription-related information to support the network entities actually handling calls and/or sessions.

- 5 Fig. 2 shows a schematic signaling diagram according to the first preferred embodiment where an IMS user can get information about service specific configurations after registration to the IMS network.

Possible service configurations could comprise the Presence server assigned to the user, the MRFC (Media Resource Function Control) assigned to the user for
10 conference purposes, other ASs which the user specifically might need to contact, e.g. by means of event subscriptions, specific URIs the user needs to register if the user wants to get the benefit of a specific service, e.g. a PTT or POC service.

According to the first preferred embodiment, the above service-related parameters can be kept updated at the user by having the UE 40 of the user subscribed to a
15 new service configuration event package. This package is either offered by the S-CSCF 10 assigned to the user or by an AS. The advantage of putting this functionality to the S-CSCF 10 would be that the S-CSCF 10 could easily download the service configuration from the HSS 20 via the Cx interface. Furthermore, the UE 40 does not need any pre-configured URI for this event package.

- 20 According to Fig. 2, the UE 40 is first registered to the IMS network (step 1). After successful registration, the UE 40 subscribes to the new service configuration event package by forwarding a SIP SUBSCRIBE request for the new service configuration event package to the S-CSCF 10 in step 2.

The successful subscription is acknowledged by the S-CSCF 10 in step 3 with a
25 SIP 200 OK response. Then, the S-CSCF 10 initiates a HSS query via the Cx interface in step 4 to thereby download the service configuration of the UE 40. The received current service configuration is then forwarded to the UE 40 in a SIP NOTIFY request in step 5. The UE 40 acknowledges the receipt by a SIP 200 OK response in step 6. Finally, in step 7, the UE 40 stores the received service configuration or uses it for an updating procedure of an earlier stored service configuration.
30

If the user or the UE 40 now wants to initiate one of the available services, for which specific configuration data has been retrieved, it can make use of the configuration data.

- 5 As a modification of the first preferred embodiment, the functionality of the new service configuration event package may be provided at a default application server (not shown in Fig. 1). In this case, the UE 40 has available a pre-configured URI for routing the SIP SUBSCRIBE request to the default server.

As an example, the content of e.g. the NOTIFY request carrying the event package data in step 5 might look as follows:

```
10 <serviceinfo xmlns="urn:ietf:params:xml:ns:serviceinfo"
    version="0" state="full">
    <service aor="sip:poc-as.home1.net" id="a1" user="sip:gema@poc.home1.net"
        sbfp="applies" media="audio" codec="amr">Push to talk over cellular
    </service>
15
    <service aor="sip:conference-factory1@mrhc.home1.net" id="a2"
        user="sip:gema@home1.net"> Automatic conference creation
    </service>
20
    <service aor="sip:mrhc1.home1.net" id="a3" user="sip:gema@home1.net">
        Conference Server
    </service>
25
    <service aor="sip:gema@home1.net" id="a4" user="sip:gema@home1.net">
        Publish your own Presence Information
    </service>
</serviceinfo>
```

As an alternative to the above example, multiple aor parameters may be provided for one service. Then, the following sub-structure can be used:

```
<service>  
  <server ...> ...  
  </server>  
</service>
```

5

Fig. 3 shows a schematic signaling diagram according to the second preferred embodiment, where the functionality of a new event package is provided at the AS 60 which provides at least one specific service application to the UE 40. The new AS specific event package can be used, for instance, to inform the use if some specific event happened, which requires de-registration of the UE 40.

According to the second preferred embodiment, the AS 60 is able to actively de-register a subscriber or a public user identity.

As indicated in Fig. 3, a pre-condition of the procedure suggested in the second preferred embodiment is that the UE 40 has been subjected to a 3rd party registration to the AS 60. After successful 3rd party registration, The UE 40 forwards a SIP SUBSCRIBE request in steps 1 to 3 towards the AS 60 via the P-CSCF 30 and the S-CSCF 10. As an example, the AS specific event package may be related to a PTT or POC service, i.e. the notification message may provide in its payload portion the following content: "event=PTT service status" or "event=POC service status". At the S-CSCF 10, predetermined filter criteria may be applied to filter out undesired or unsuccessful requests. Thereby, a control function is provided at the S-CSCF 10, by which it can be controlled to which AS specific event packages subscription is allowed.

After successful subscription, the AS 60 acknowledges the subscription by a SIP 202 Accepted acknowledgement routed via the S-CSCF 10 and the P-CSCF 30 to the UE 40 in steps 4 to 6. Then, the AS 60 immediately issues a SIP NOTIFY request comprising the current state of the event package in its payload portion, e.g. "state=active, event=logon", via the S-CSCF 10 and the P-CSCF 30 to the UE 40 in steps 7 to 9. The receipt of the NOTIFY request is acknowledged by the UE 40 with a SIP 200 OK response in steps 10 to 12.

At a later point in time, the AS 60 may deny the service for the subscriber having an AS specific public user identity (IMPU) e.g. due to some kind of failure situation or due to the fact that the subscriber's prepaid account has been expired. This

may be interpreted at the AS 60 as the occurrence of an AS specific event, e.g. "log off" PTT-IMPU. In response to the occurrence of the AS specific event, the AS 60 informs the UE 40 by sending a new SIP NOTIFY request with a new state information in its payload portion, e.g. "state=terminated, event=logoff", via the S-CSCF 10 and the P-CSCF 30 to the UE 40 in steps 13 to 15. In steps 16 to 18, the UE 40 acknowledges receipt of the notification by responding with a SIP 200 OK message.

The received new state information initiates a de-registration procedure at the UE 40 with the concerned public user identity related to the new event package. In steps 19 to 24, the UE 40 triggers de-registration by sending a SIP REGISTER message with a corresponding parameter, e.g. expires=0, via the P-CSCF 30 to the S-CSCF 10 (steps 19 and 20) which responds with a SIP 200 OK acknowledgement (steps 21 and 22). Then, the S-CSCF 10 initiates de-registration of the concerned public user identity at the AS 60 by forwarding a SIP REGISTER message with the corresponding parameter, e.g. expires=0, to the AS 60 (step 23) which also responds with a SIP 200 OK acknowledgement.

As a result, by providing the new event package at the AS 60, the AS 60 is in a position to actively initiate de-registration of subscribers or user identities.

It is noted that the present invention is not restricted to the preferred embodiments described above. The present invention may be implemented in any data network, where a subscription to a event package can be implemented to thereby inform a subscriber of a service-related information, e.g. a service-related state and/or a service configuration. The embodiments may thus vary within the scope of the attached claims.

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Claims

1. A method of forwarding a service-related information from an IP-based network to a network user, said method comprising the steps of:
 - a) providing at said IP-based network a first event package directed to a service configuration and/or at an application server a second event package directed to a de-registration state of said network user;
 - b) initiating a subscription of said network user to said first and/or second service-related event package; and
 - c) transmitting a notification informing about said service configuration and/or said de-registration from said IP-based network and/or said application server to said network user in response to said subscription initiation.
2. A method according to claim 1, wherein said first event package is offered by a session control device (10) assigned to a terminal device (40) of said network user, and wherein said subscription is initiated by said terminal device (40) to said session control device (10).
3. A method according to claim 2, wherein said session control device is an S-CSCF (10) of an IMS network.
4. A method according to claim 1, wherein said first event package is offered by a default server, and wherein said subscription is initiated by a terminal device (40) of said network user to said default server.
5. A method according to any one of the preceding claims, wherein said initiation step is performed after a successful registration procedure of a terminal device (40) of said network user.
6. A method according to any one of claims 2 to 5, wherein said service-related information is stored at said terminal device to allow said network user to make use of said service-related information.
7. A method according to claim 1, wherein said subscription to said second event package is initiated to said application server (60).

8. A method according to claim 7, wherein said subscription is initiated by forwarding a SIP SUBSCRIBE request from a terminal device (40) of said network user towards said application server (60).
- 5 9. A method according to claim 7 or 8, wherein said subscription is initiated after a successful registration of said network user to said application server (60).
- 10 10. A method according to claim 8, further comprising the step of subjecting said SUBSCRIBE request to at least one filter criterion at a session control device (10).
- 10 11. A method according to any one of claims 7 to 10, wherein said notification is transmitted from said application server (60) towards a terminal device (40) of said network user in response to the occurrence of a specific event at said application server (60).
- 15 12. A method according to claim 11, wherein said specific event is caused as a result of a failure situation or an exceeding of a prepaid account.
13. A method according to any one of claims 8 to 12, wherein said application server (60) is a Push To Talk server.
14. A method according to any one of the preceding claims, wherein said notification is transmitted in a SIP NOTIFY message to said network user.
- 20 15. A method according to any one of the preceding claims, wherein said IP-based network is a SIP network.
16. A network device for serving a network user in a data network, said network device (10) being configured to store an event package directed to a service configuration of said network user, and to transmit a notification with a service configuration information towards said network user in response to a
25 subscription of said network user to said service-related event package.
17. A device according to claim 16, wherein said service-related information comprises a service configuration.

18. A device according to claim 16 or 17, wherein said network device (10) comprises a call state control function of an IMS network.
19. A device according to claim 16 or 17, wherein said network device is a default server.
- 5 20. An application server for providing at least one service application to a network user, said server (60) being configured to offer at least one event package directed to a service configuration and/or a de-registration state of said network user, and to forward a notification informing about said service configuration and/or said de-registration towards said network user in response to a subscription of said network user to said at least one event package.
10
21. A server according to claim 20, wherein said server (60) is configured to forward said service-related information in a SIP NOTIFY message.
- 15 22. A server according to claim 20 or 21, wherein said server (60) is a Push-to-Talk or Push-over-Cellular server.
23. A server according to any one of claims 20 to 22, wherein said server (60) is arranged to forward said notification in response to the occurrence of a specific event at said server (60).
- 20 24. A server according to claim 23, wherein said specific event is caused as a result of a failure situation or an exceeding of a prepaid account.
- 25 25. A terminal device for providing a connection to a service application of an IP-based network, wherein said terminal device (40) is configured to initiate a subscription to at least one event package directed to a service configuration and/or a de-registration state of said terminal device in response to a successful registration to said IP-based network.
26. A terminal device according to claim 25, wherein said terminal device (40) is configured to initiate said subscription by transmitting a SIP SUBSCRIBE message to at least one of a session control device (10), a default server or an application server (60).

27. A system for forwarding a service-related information to a network user, said system comprising a terminal device according to claim 25 or 26 and at least one of an application server according to any one of claims 20 to 24 and a network device according to any one of claims 16 to 19.

Abstract

The present invention relates to a method and system for forwarding a service-related information to network user, wherein at least one new event package directed to a service configuration and/or a de-registration state of said network user is provided at a session control device (10) or a default server or an application server (60), respectively. A terminal device (40) of the network user initiates a subscription to said new event package. In response thereto, a notification informing about said service configuration and/or said de-registration state of said network user is generated and routed to the terminal device (40) to be made available to the network user. Thereby, a very generic way is provided to offer multiple services to the terminal device without requiring any pre-configuration. Moreover, the application server (60) is able to actively initiate a de-registration of a subscriber or a specific user identity.

15 [Fig. 2]

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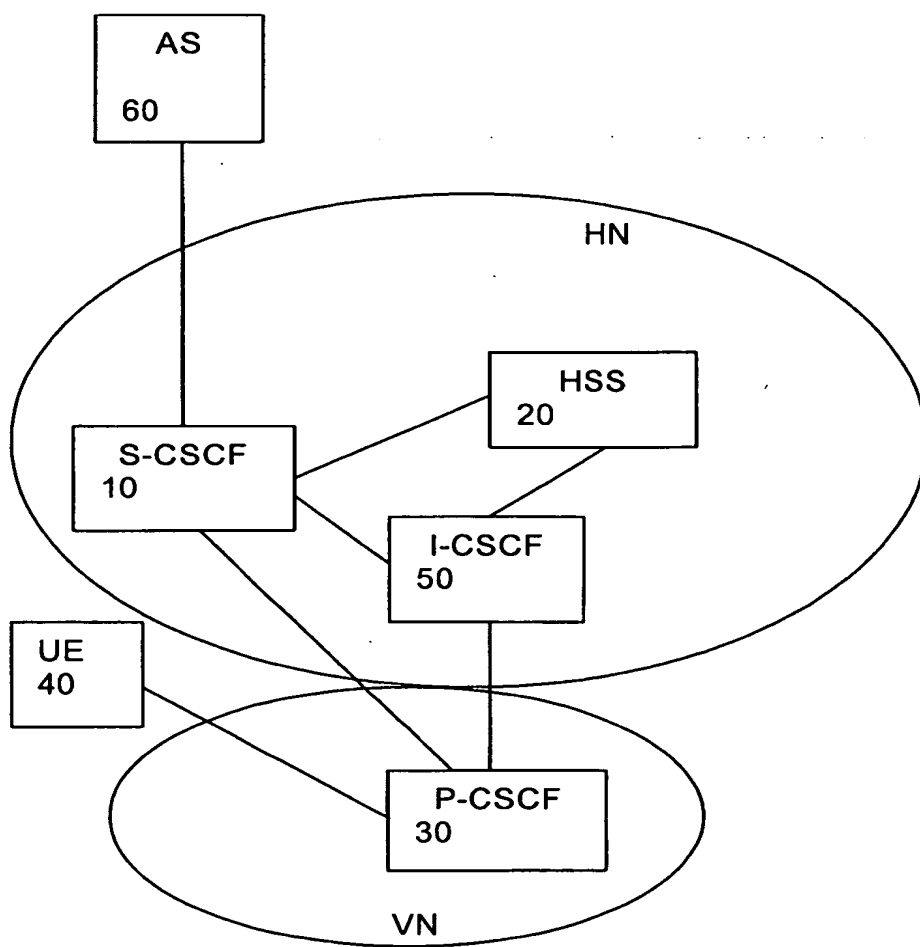
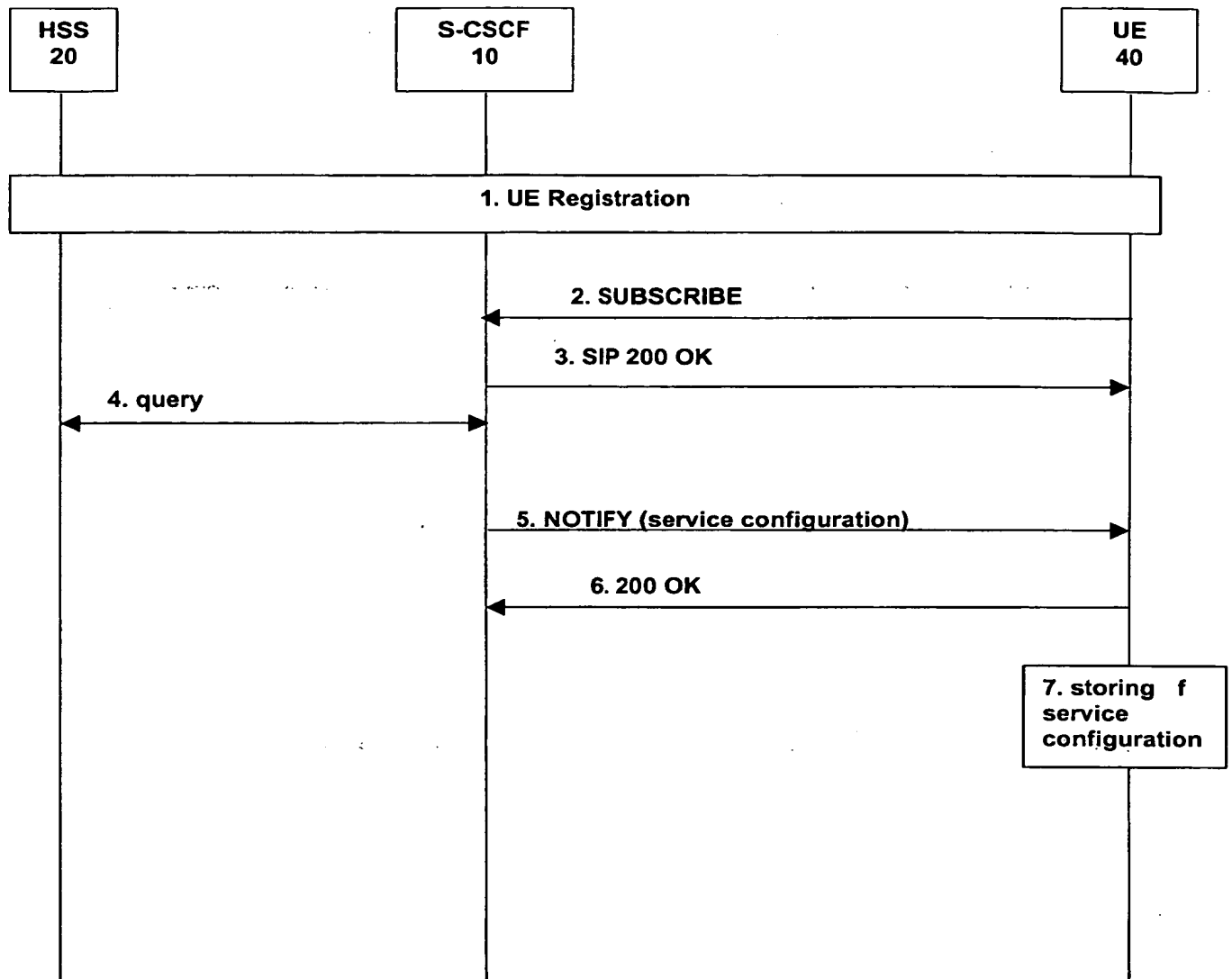


Fig. 1

**Fig. 2**

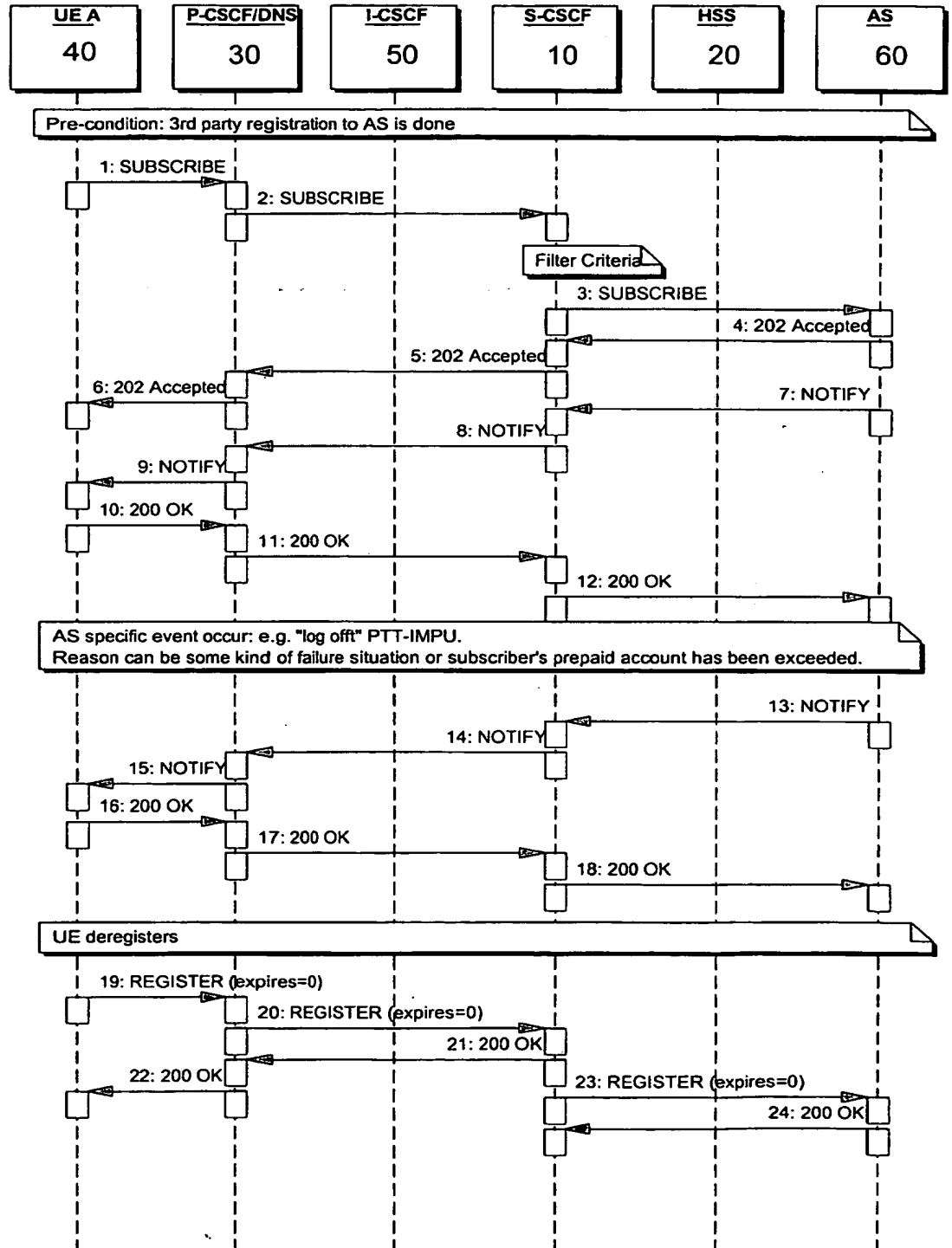


Fig. 3

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